

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improved Manner of Manufacture of Contact Lenses

We, MUELLER - WELT G.M.B.H., a German Company, of 5, Fangelbachstrasse, at Stuttgart 8, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the manufacture of contact lenses.

Hitherto lenses of this kind have been produced in many different ways, principally by casting with or without pressure; by a pressing operation; by polymerisation; by turning or grinding from a block; or by blowing them from tubes. All these processes are expensive. Further, in the bending or hollow moulding of heated thermoplastic transparent sheets, for example, silicate glass or plastic glass sheets, it was known that under the heating action the opposite plane surfaces of the sheets became displaced and produced irregularities in the form of waves, corrugations or local thickening in the moulded product. It was considered (see for example German Patent Specification No. 729,076) that such irregularities would affect the transparency and cause distortion of the light rays, thereby reducing the optical value of the moulded sheet. Thus it became necessary to remove these irregularities by grinding and polishing the curved surfaces. It was also known (see German Patent Specification No. 743,316) to mould sheets of transparent thermoplastic material using male and female dies, or a pressure fluid with or without a matrix, but mechanical or optical irregularities, especially variations of unevenness in the wall thickness, were found to exist, rendering such products unsuitable for high quality optical needs.

As the result of experiments which we have made in the moulding of sheets of transparent plastic material formed from acrylic acid esters by a blowing operation it has been found that the marginal portions of such moulded products have the

most pronounced irregularities while the centre portions are free or substantially free from such defect. This may be due to the fact that during the blowing operation the central part of the sheet is distended to a much greater extent, and becomes considerably thinner than the marginal portions, so that whereas at said portions only the surface parts of the sheet tend to flow under the fluid pressure, a much greater thickness of material is displaced at the centre of the sheet.

This discovery that the central portion of the sheet shows so little irregularity as not adversely to affect the optical qualities of said central portion leads to the idea of producing contact lenses by such process, since it is only the central portion of a contact lens corresponding to the natural iris and pupil through which the light rays are passed to the eye, the remainder of the lens constituting a support which contacts the sclerotic surface of the eyeball.

The invention accordingly provides a method of making contact lenses which consists in securing to a concave matrix having a central bulbous depression corresponding to the natural iris and pupil the marginal part of a sheet of transparent plastic material formed from an acrylic acid ester and which has been made soft and pliable by heating, directing a stream of air under pressure against that surface of the sheet remote from the matrix while the sheet is in pliable condition, thereby to press the sheet into contact with, and so conform to the shape of, the matrix surface, and severing the unmoulded marginal part after the sheet has set.

After cooling the shaped piece again becomes hard and solid. If necessary, the shaped piece may be subjected to a subsequent treatment by chemical or thermal means or by cold-curing.

The invention is illustrated by way of example in the accompanying drawing, wherein:—

Figure 1 is a sectional view of a matrix

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showing the arrangement before the shaping operation, and

Figure 2 is a similar view showing the arrangement after the shaping operation.

- 5 The half form (matrix) is designated by 1. A preheated sheet 2 formed from, for example, polymethacrylic acid esters or methyl methacrylate, which has become soft and pliable by heat is placed over the matrix and clamped in place at its margin by means of an upper part 3. Compressed air admitted through a channel 3a in the upper part forces the sheet against the form 1, shaping it into a contact lens A which, after it has again become hard and solid is finished to its proper diameter by cutting off the marginal portions 2a. This is done using the same kind of tools as in conventional metal-cutting operations.

20 What we claim is:—

The method of making contact lenses which consists in securing to a concave matrix having a central bulbous depression corresponding to the natural iris and pupil the marginal part of a sheet of transparent plastic material formed from an acrylic acid ester and which has been made soft and pliable by heating, directing a stream of air under pressure against that surface of the sheet remote from the matrix while the sheet is in pliable condition, thereby to press the sheet into contact with, and so conform to the shape of, the matrix surface, and severing the unrounded marginal part after the sheet has set.

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